

**REMARKS**

Please reconsider the application in view of the above amendments and the following remarks. Applicant thanks the Examiner for carefully considering this application.

**Disposition of Claims**

Claims 1-10 are currently pending in this application. Claims 1, 6, and 9 are independent. The remaining claims depend, directly or indirectly, from claims 1, 6, or 9.

**Amendments to the Claims**

Claims 6 and 9 have been amended by way of this reply. Claim 6 has been amended to clarify that pressing the dusts within the mold to provide a solid iron product is done without using an organic or an oxide binder. Claim 9 has been amended to improve the language of the claim. No new matter has been added.

**Rejection(s) under 35 U.S.C. §112**

Claims 1-10 stand rejected under 35 U.S.C. §112, first paragraph, as failing to comply with the written description requirement. The Examiner asserts that claims 1, 6, and 9 “recite the limitation that the product contains neither organic nor oxide binder. However, the specification does not provide for this limitation.” Applicant respectfully notes that, in paragraph [0008], the specification states “If it is only the iron and steel dust pressed and formed with no binder contained therein, preparation and addition of the binder are unnecessary and, therefore, a low cost manufacture is possible.” Furthermore, paragraphs [0042]-[0047] list the compositions of the steel manufacturing dust as well as a carbon type powder that may be used as a binder. Applicant notes that carbon type powder is not an organic (i.e. there is no hydrogen bonded to the carbon) or oxide binder. Thus, the specification discloses that the dust can be

pressed and formed either with no binder therein, or if a binder is employed, the specification discloses the use of a binder that is neither organic nor an oxide. Thus, the limitations are supported by the specification, and the written description requirement is thus satisfied. Accordingly, withdrawal of this rejection is respectfully requested.

**Rejections under 35 U.S.C. §102**

Claims 1-3, and 6-8 stand rejected under 35 U.S.C. §102(b) as being anticipated by U.S. Patent No. 3,645,719 (“Minnick”). This rejection is respectfully traversed for the reasons set forth below.

One or more embodiments of the claimed invention relate to a steel manufacturing dust. More specifically, one or more embodiments relate to a solid iron product formed by pressing and reforming dusts, which occur in exhaust gases within a melting furnace during an iron and steel manufacturing process. During an iron and steel manufacturing process, dry dusts are naturally generated in a melting furnace as a result of coagulation of generated vapors. Although it is highly desirable to re-utilize these dusts containing rich iron, it has been difficult to efficiently handle the dusts because they are easily scattered. For example, adding an organic binder allows the dusts to be conveniently solidified, but it also results in introduction of a contaminant that makes technically difficult to recover iron from the solidified dust. One or more embodiments employs a process of pressing and reforming dusts into solid product without using either organic or oxide binders, thereby allowing a recycling process of the iron contained in the dust to be dramatically more efficient.

Accordingly, independent claim 1 requires, in part, “a solid iron product formed by pressing and reforming dusts occurring in exhaust gases within a melting furnace during an iron and steel manufacturing process,” and “the solid product contains neither organic nor oxide

binder.” Similarly, independent claim 6, as amended, requires, in part, “subsequently collecting dusts, occurring in exhaust gases within a melting furnace during an iron and steel manufacturing process,” “pressing the dusts within the mold without using an organic or an oxide binder to provide a solid iron product; and reentering the solid iron product into the iron and steel manufacturing process, wherein the solid iron product contains neither organic nor oxide binder.”

In contrast to the claimed invention, Minnick discloses a steel-making process where dolomite is charged to a furnace as a basic slag-forming ingredient, the improvement being the intimate mixing of dolomite with iron oxide prior to charging (*see*, for example, col. 3, lines 38-47 of Minnick). However, Minnick fails to show or suggest at least pressing and reforming dusts occurring in exhaust gases within a melting furnace during an iron and steel manufacturing process, without adding an organic or oxide binder, as required by the claimed invention. In fact, Minnick does not address any issue of efficiency in handling dusts occurring in a steel manufacturing process for recycling iron, as does the claimed invention. Thus, Minnick fails to show or suggest at least a solid iron product containing neither organic nor oxide binder, as required by the claims. Furthermore, Minnick fails to show or suggest “pressing the dusts within the mold without using an organic or an oxide binder to provide a solid iron product,” as required by claim 6, because Minnick employs an oxide binder.

In the Office Action, the Examiner ignores the limitation in claim 1 requiring a solid iron product containing neither organic nor oxide binder, asserting that “claim 1 is a product by process claim, and even though product-by-process claims are limited and defined by the process, determination of patentability is based on the product itself. The patentability of the product does not depend on its method of production. If the product in the product-by-process

claim is the same or as obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process.”

Applicant respectfully notes that claim 1 requires that *the solid iron product*, which is *the product itself*, not contain any organic or oxide binder. Because Minnick employs dolomite with iron oxide, the *resulting product of Minnick contains an oxide binder*. Thus, the product of claim 1 is distinguished from the product Minnick in requiring *a solid iron product containing no oxide binder*.

The Examiner further states in page 3 of the Office Action that, in Minnick, “The product does not have to contain oxide but can contain carbonate (column 5, lines 7-10).” Applicant respectfully notes that carbonate is organic. Thus, regardless of whether the binder contains oxide or carbonate, Minnick fails to show or suggest that the product contains “neither organic nor oxide binder,” as required by claim 1.

In view of the above, independent claims 1 and 6 are patentable over Minnick, at least for the above reasons. Claims 2-3 and 7-8 depend, either directly or indirectly, from claims 1 and 6, and are patentable for at least the same reasons as claims 1 and 6. Accordingly, withdrawal of this rejection is respectfully requested.

Claims 9 and 10 stand rejected under 35 U.S.C. §102(b) as being anticipated by Japanese Patent Publication No. JP 07-102302 (“Hiroshi”). This rejection is respectfully traversed.

Claim 9 requires, in part, “A manufacturing apparatus for a solid iron product that contains neither an organic nor oxide binder,” and “the apparatus forms the solid iron product without adding an organic or an oxide binder.”

Hiroshi merely discloses a method for preparing molded green compacts from magnetic powder using a rubber mold. (*see*, for example, Abstract of Hiroshi). However, Hiroshi fails to show or suggest any feature of a manufacturing apparatus “for a solid iron product that contains neither organic nor oxide binder” and “wherein the apparatus forms the solid iron product with adding neither the organic nor oxide binder” as required by claim 9. Nowhere does Hiroshi show or suggest the reuse of dusts as a solid iron product that contains neither organic nor oxide binder, as required by claim 9. In fact, Hiroshi teaches usage of a binder for forming the mold green and does not show or suggest any specific contents thereof.

In the Office Action, the Examiner asserts that “the limitation of the solid product containing neither organic nor oxide binder is intended use.”

A functional limitation is an attempt to define something by what it does, rather than by what it is (*e.g.*, as evidenced by its specific structure or specific ingredients). There is nothing inherently wrong with defining some part of an invention in functional terms. Functional language does not, in and of itself, render a claim improper. *In re Swinehart*, 439 F.2d 210, 169 USPQ 226 (CCPA 1971).

It has been held that the limitation used to define a radical on a chemical compound as “incapable of forming a dye with said oxidizing developing agent” although functional, was perfectly acceptable because it set definite boundaries on the patent protection sought. *In re Barr*, 444 F.2d 588, 170 USPQ 33 (CCPA 1971).

The functional limitation of claim 9 sets definite boundaries of the patent protection sought, *i.e.*, for an apparatus forms that forms the solid iron product without adding an organic or oxide binder. Thus, the functional limitation distinguishes claim 9 from Hiroshi.

Even considering, *arguendo*, that only structural limitations can distinguish the claims from the prior art, Applicant respectfully notes that claim 9 is still distinguishable from Hiroshi. Claim 9 of the present application explicitly requires “the apparatus forms the solid iron product without adding an organic or an oxide binder.” Thus, claim 9 requires that the apparatus be capable of forming the iron product without adding organic or oxide binder. Contrary to the claimed apparatus, Hiroshi employs a rubber mold 1 to create green compact. Thus, the apparatus of Hiroshi is not capable of forming “the solid iron product without adding an organic or an oxide binder,” as required by claim 9, because the rubber mold would not allow enough compression force to be applied to the dusts to create the solid iron product.

In view of the above, claim 9 is patentable over Hiroshi, at least for the above reasons. Claim 10 is dependent from claim 9, and is patentable at least for the same reasons as claim 9. Accordingly, withdrawal of this rejection is respectfully requested.

### **Rejections under 35 U.S.C. §103**

Claims 4 and 5 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Minnick in view of U.S. Patent Application Publication No. 2002/0020108 (“Anderson”). This rejection is respectfully traversed.

As discussed above independent claim 1 is patentable over Minnick. Further, Anderson fails to supply that which Minnick lacks.

Anderson discloses a method of forming combustible briquettes from industrial waste products (*see*, for example, paragraphs [0001] and [0007] of Anderson). The briquettes can then be used as a fuel in a furnace. However, Anderson also fails to show or suggest “*pressing and reforming dusts* occurring in exhaust gases within a melting furnace during an iron and steel manufacturing process, *without adding an organic or oxide binder*,” as required

by claim 1. Anderson is not specifically directed to handling dusts occurring in a steel manufacturing process for recycling iron and, thus, the reference does not teach any specific process of “*pressing and reforming dusts occurring in exhaust gases without adding an organic binder.*”

In view of the above, claim 1 is patentable over Minnick and Anderson, whether considered separately or in combination, at least for the above reasons. Claim 4 and 5 depend indirectly from claim 1. Thus, claims 4 and 5 are patentable over Minnick and Anderson, at least for the same reasons as claim 1. Accordingly, withdrawal of this rejection is respectfully requested.

**Conclusion**

Applicant believes this reply is fully responsive to all outstanding issues and places this application in condition for allowance. If this belief is incorrect, or other issues arise, the Examiner is encouraged to contact the undersigned or his associates at the telephone number listed below. Please apply any charges not covered, or any credits, to Deposit Account 50-0591 (Reference Number 17214/013001).

Dated: September 4, 2009

Respectfully submitted,

By 

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